Report on the TRC Meeting of December, 2001

I. BACKGROUND INFORMATION

Fermilab management has formed a Technical Review Committee (TRC) to evaluate the plans for upgrading the CDF and D0 experiments for the higher luminosity and shorter bunch spacing of Run 2b. Appendix 1 gives the charge to the committee and Appendix 2 its membership. The committee held its first meeting from December 3 to 5, 2001 at Fermilab. The agenda is given in Appendix 3.

Prior to this meeting both collaborations had presented TDRs for their upgrades to the Physics Advisory Committee (PAC). Following the November meeting of the PAC, the laboratory management gave each experiment preliminary guidance for the M&S funding and the manpower to be expected from the laboratory. Both collaborations were asked to provide detailed WBS descriptions and resource loaded schedules for their upgrades. At the time of this review the work was in progress and initial versions were presented.

The committee was told that the laboratory plans to have both projects base-lined by the DOE in spring 2002. There is strong schedule pressure to use some funds for R&D and prototype work before then.

II. SILICON UPGRADES

A. Observations common to CDF and D0

Both the CDF and the D0 groups presented proposals for completely rebuilt silicon detectors for Run 2b. The existing detectors cannot survive the radiation associated with an integrated luminosity of $15fb^{-1}$. The use of double-sided detectors, their specifications, and the way they are operated will prevent the inner layers from operating after less than 5 fb^{-1}. Some electronic boards located inside the tracking volume will also fail at similar levels. Finally, the SVX2 and SVX3 chips are not sufficiently radiation hard and will seriously deteriorate or cease to function after similar exposures. The outer layers of the existing detectors, however, might well survive the entire exposure of Run 2b.

It is clear that both experiments will need good silicon trackers to fully participate in the exploitation of Run 2b and to contribute to the Higgs search. The sensitivity of the Higgs discovery power to the b-tag efficiency was shown by CDF. A relative reduction of 4% in the b-tag efficiency corresponds to roughly a 2-3 GeV reduction in the mass reach or about a 14% increase in the required luminosity.

The committee reviewed in detail the proposed designs. Overall, they seem adequate to address the physics requirements of Run 2b although a fully quantitative optimization of the cost versus performance is still lacking.

Technical issues

1. Both proposed silicon trackers are technically sound. The groups have fully exploited the development done for the LHC experiments, producing a design employing proven techniques with minimal R&D. In addition, CDF and D0 are sharing some of the remaining R&D work on mechanical structure, sensors, hybrids, etc. The committee commends the collaboration of CDF and D0 on technical developments and considers that an increased cooperation would be beneficial.
2. The silicon trackers envision the use of single-sided detectors with edge guard rings, which will allow safe operation in high radiation areas even after type inversion. In a meeting involving the two experiments and a sub-set of the committee, a methodology was established to assess projected radiation damage based on CDF running experience. This should supersede the overly pessimistic projections by D0.
3. The acquisition of the silicon sensors is a large part of the budget. At present, other experiments are able to buy silicon sensors with specifications similar to the CDF and D0 requirements for a significantly lower price in quantities of 10,000. A very aggressive acquisition strategy is recommended, which includes the identification of cost drivers in the sensor specs, including the possibility of using thicker detectors. In addition, the sensor purchase should be coordinated between the two experiments, to obtain the lowest unit cost.
4. Both experiments will perform ladder assembly using optical alignment of the sensors. We encourage the experiments to explore tightening the tolerance on the sensor dicing, so that sensor edges can be used for mechanical alignment of the sensors on the ladder. This would lead to faster assembly and reduced manpower requirements. This technique is currently used by other experiments. The lower cost silicon mentioned above in Item 3 was obtained with such mechanical specs.
5. In laying out their detectors both groups have made a commendable effort to simplify their design and to keep the number of different parts (HDIs, sensors, cables etc.) to a minimum. Further reduction might be possible at the cost of some performance reduction. For instance, the outer layer stave design might be used in the Layer 1 layout.
6. The cooperation of CDF and D0 on the development the 0.25μm rad-hard SVX4 ASIC should be applauded. We note, however, that the chips are not yet in hand and the project has already suffered a 4 week delay compared to the October plan. The SVX4 chip remains one of the critical items in the project.
7. The committee encourages the CDF and D0 groups to investigate other potential areas of common development such as hybrids and staves. This could allow savings on budget, schedule, and risk. In particular the groups should consider using the same Layer 0 design.
8. The cooling scheme and electrical connections seem generally sound. The analog flex cables used in Layer 0 are a source of concern, both in terms of possible noise increase and digital signal pickup, and in terms of production risks. The groups should use an established technology, a conservative layout, and contemplate multiple vendors. A collaboration of the two experiments on the acquisition would reduce the risks involved.
9. The minimization of repair and rework on the staves due to defective parts (HDIs, sensors) is crucial for the success of the project. We recommend that full QC/QA procedures are specified for all parts and that testing is limited to the crucial steps in the assembly.

10. The industrial fabrication of the simple silicon sensors which both experiments plan to use has matured greatly. The quality of the sensors and the ability of manufacturers to test them result in a product which requires only minimal testing by the end user. We recommend using tight specifications on the overall leakage current, and eliminating time consuming tests of single strip currents. Similarly, the coupling capacitor, I-V and C-V curves of the sensors should be tested by the manufacturer and only spot-checked by the experiments. The total current should be measured before every integration step and coupling caps should be tested after bonding. This limitation of the testing to a few vital parameters will free up personnel for other tasks.
11. Both experiments plan to use single-sided AC-coupled silicon detectors with polysilicon bias. This will allow safe operation in a high radiation environment even after type inversion. One caveat is that the position resolution may deteriorate after type inversion because intermediate strips are employed for interpolation of the position using charge division. The impact of radiation damage on resolution should be investigated with irradiated sensors. This might be done as a joint project between the two experiments.

Budget, Schedule and Manpower

1. The M&S budget estimates for the two projects appear to be sound. Unfortunately the funding profile proposed by the lab is flat, while a front-loaded budget is needed for the purchase of the big-ticket items. No obvious solution for staging part of the silicon detectors was found. Although most of the budget estimate is based on actual preliminary quotes, the groups are continuing to look for additional savings that may be possible in several items.
2. The schedule is very tight. The groups have both assembled detailed schedules, although the methods used for building the schedule and resource loading it differ. These differences make a direct comparison difficult. The groups have developed a set of detailed milestones well distributed in the project time.
3. We recommend that both experiments include in their schedules a full sector test of the final detector. This would allow an early detection of noise and other problems associated with system integration.
4. The manpower estimates for the two groups are built using very different systems and differ by a large amount, both in engineering and in labor requirements. The committee recommends that the two groups reevaluate their manpower needs according to clear rules to be provided by the laboratory management, starting from the detailed schedule and clearly separating out baseline needs from contingency. The manpower estimate should properly detail as a function of time all work done inside and outside the laboratory, whether or not it is charged to the project.

Descoping options

The committee examined some descoping option that might be exercised if needed:

1. Partial replacement: The groups have already examined the possibility of replacing only the inner layers and the disks of the present detector with radiation hard modules. Replacing the inner layers is very hard if not impossible mechanically. Another option would be to reuse the current staves on a new mechanical structure that would host the

old staves at large radius and new ones at small radius. This would certainly imply a much longer downtime for the experiments.

2. Smaller detector: The present design can be descoped in various ways such as by removing layers, reducing acceptance, or reducing segmentation. We recommend the groups study the relative performance of the various options, in the metric of the Higgs search, before baselining the project.

B. CDF Silicon upgrade

The CDF silicon tracker group presented their proposal for a completely new silicon detector for Run 2b. It represents a descoped version of the TDR version of the silicon tracker presented at the November PAC meeting. A fairly large amount of scientific justification of the proposed detector was presented. In addition, a first optimization study of the number of layers was shown, which demonstrated that the proposed layout is reasonably robust against one layer failing, but that the additional loss of an axial and stereo layer in the COT would compromise the tracking performance. This result is preliminary, but shows that the right questions are being addressed.

Technical Issues

1. The stave design allows considerable flexibility in configuring the detector. The staves will accept either axial, 90-degree, or small-angle stereo modules, so the decision on how to configure the detector may be taken at the time of ordering the sensors. The collaboration should carefully evaluate the benefits and risks associated with the 90-degree option since it implies double-metal sensors, unlike the small-angle stereo option.
2. The cooling scheme and electrical connection seem to be sound. The use of the analog cables for Layer 0 was justified in an analysis of the noise performance of the present Layer 00. The cooling is done with a water-glycol mixture for the 3KW total heat load. The cooling tubes are integrated into the staves and several staves are in series. To keep the temperature rise of the coolant within 1degree C, the flow rate has to be high. This should be prototyped on live detectors to check for sonic vibration.
3. Separate mechanical supports are foreseen for the inner layers and the rest of the detector. This is a commendable feature so that inner layers could be replaced separately if needed. On the other hand, the design of the support structure for the outer layers (L2-5) is such that replacement of a single stave is nearly impossible without extensive disassembly of the detector. The group should investigate the possibility of mounting the staves on the bulkheads without optical alignment as is done by D0. This would make possible the replacement in the clean room of a single stave.
4. Many other important technical issues are common to both experiments are enumerated above.

Budget, Schedule and Manpower

1. The M&S budget was developed based on the experience with L00 because it uses similar technologies. A sizable contribution from foreign sources is expected. The funding profile proposed by the lab is flat, while a front-loaded budget is needed for the purchase of the expensive items. Foreign contributions (e.g. from Japan) may help to even this out.

2. The schedule is very tight. There is a believable set of top-level milestones indicating when the first prototype will have to be built, when construction has to start, etc. This hinges on the availability of SVX4 chips, for which two iterations of prototypes are allowed. The schedule shows production of one stave per day, and a 6 month float at the end of construction. The required manpower matches the FNAL allocation, but the simultaneous construction of silicon detectors for CDF and D0 will put a strain on the available facilities at SiDet.
3. The manpower budget was not developed loading the detailed schedule, but rather identifying the basic tasks during the prototyping and fabrication phase and loading these tasks with the required manpower. As such, the man-power estimate of 56 person-years represents a lower limit, since it does not include installation, and it is not fully thought out on the detailed schedule. On the other hand, the committee considers the estimate reasonable for the prototyping and fabrication activities.

Descoping Options

1. The group should be commended for its effort to identify possible further descoping options. With respect to the design presented to this committee they considered dropping one layer and using the standard L2-5 stave design also for Layer 1. The former would cause some reduction in b-tagging efficiency, especially if the inner COT layers do not perform as expected. The latter would result in reduced angular coverage in Layer 1. The committee considers both options to be viable and encourages the group to perform full optimization studies.

C. D0 Silicon upgrade

The committee reviewed in detail the proposed design, which overall seems to be adequate to address the physics requirements of Run 2b. Unfortunately a fully quantitative optimization of the cost versus performance is still lacking.

Technical issues

1. The proposed silicon tracker is technically sound.
2. The group is examining the possibility of using oxygenated detectors. Based on recent results, we expect that oxygenated sensors will likely give only marginal advantages.
3. Many other important technical issues that are common to both experiments are enumerated above.

Budget, Schedule and Manpower

1. The M&S budget appears to be sound. In the discussion, several items were identified for which lower cost estimates or bids have been received, or for which expectations of cost savings have been advanced. These point to potential savings of $1-2M. D0 management refused the temptation to reduce the budget now in order to meet the laboratory guidelines. In the future these savings should be included in the estimates, using appropriate contingencies.
2. The schedule is very tight. The group should be commended for the effort put into developing a detailed, resource-loaded schedule. The group has developed a set of

detailed milestones well distributed in the project time. The committee feels a set of order 10 higher level milestones should complement the detailed milestones.

4. The presented manpower estimate comes from the ground-up resource-loading of the schedule and totals 81 person-years of technicians and engineers. In the discussion it became clear that contingency is inserted in every detailed activity of this estimate. An estimate of the effective need without contingency was prepared overnight and resulted in a revised estimate of 73 person-years. The principal source of this correction is a more efficient distribution of technician time during the production phase. It should be mentioned that D0 does include manpower for the installation.
5. After removing the lower-level contingencies, the manpower estimates are still judged to be too high. This applies especially to the prototyping ramp-up phase in 2002/2003, where a large number of engineering and technical personnel are budgeted. It is hard to imagine that D0 would have enough work for these people, given that the designs stress simplicity, modularity and commonality between layers. Even though D0 could argue that the project has not started yet, the budget shows a very large number of engineers, designers and technicians on the job starting in 2002. This is unrealistic. In addition, the University of Washington is supplying a sizable engineering contribution to the Layer 0-1 structure.
6. Bringing in engineering man-power from foreign collaborators would help with the man-power problem, but D0 should be careful to get firm commitments from foreign funding agencies to avoid creating a schedule risk.
7. It is not entirely clear if the group working on the Run 2b upgrade is large enough, given that they just finished the Run 2a vertex detector installation. They are still trying to understand the performance of the existing detector and in addition may want to do some physics analysis. It is recommended that they identify clearly the tasks related to the critical path (e.g. SVX4 test and preparation, module test and preparation) and make sure sufficient resources are allocated, taking into account some delays in competing tasks. On the other hand, the group is very experienced and should be able to "hit the ground running." Simplification of assembly and test procedures might help.

<u>Descoping options</u>
The committee examined some descoping options that might be exercised if needed:

1. Smaller detector. The present design can be descoped in various ways:
   - Leave out Layer 4, Layer 1, or both
   - Leave off sensors at high z
   - More ganging

   We recommend that the group study the relative performance of the various options, in the metric of the Higgs search.

III. OTHER CDF UPGRADES

CDF proposes two additional upgrades.

1. Central Preshower & Crack Upgrades: The current CDF central preshower (CPR) detector will not function well under Run 2b conditions because its segmentation is too coarse and its integration time too long.

The preshower detector has played an important role in the CDF physics program, and has been used in about half the physics analyses to date. Although the effect of the CPR system on Higgs sensitivity was not presented in detail, its absence would clearly have a negative impact since it plays an important role in electron identification. There is also reasonable expectation of improving the jet energy resolution using this device.

Comments:
Based on past experience and reasonable extrapolation to Run 2b this upgrade appears to be well justified. The design takes good advantage of available materials from other projects and several collaborators are prepared to contribute additional resources. The design is fairly mature, but R&D is still needed to specify the final design and construction plans.

Given the low relative cost and the importance to CDF physics, the central preshower and crack upgrades should be supported. The proponents are encouraged to prepare a detailed resource loaded schedule including both M&S costs and labor costs as soon as possible. The sources of funding should also be identified.

2. CDF DAQ and Level 3 farm: CDF has presented a plan to upgrade the event-builder, in order to cope with a factor of 2 shortfall in throughput for $5x10^{32}$ operation. The current system uses an ATM event builder switch providing 16MB/s (OC3) links, that limits the Level 3 input rate to 300-500Hz. The proposal is to upgrade this switch and the connected network cards to 64MB/sec (OC12). The software effort to develop drivers will be provided by MIT and is not included in the costs.

Comments:
The committee finds that this approach mitigates risks as it keeps the existing system and upgrades only commercial components. It also minimizes additional development efforts on software.

CDF has made a conservative estimate of the hardware costs using recent quotes from vendors. The total costs of $538K contain adequate spares and a 30% contingency.

The committee endorses the proposal and recommends performing the update in time for Run 2b running.

The Level-3 farm will need larger computing capacity to handle the increased rates. CDF is not asking for Level-3 upgrade funds out of the Run 2b upgrade budget, but instead plans to continuously replace aging PCs using operations funds, at a level of $500K over 8 years.

The committee agrees with this approach, that will gradually increase the Level 3 capacity at an appropriate level, benefiting from Moore's law.

IV. OTHER D0 UPGRADES

The proposed Level 1 trigger/DAQ upgrades are needed for the D0 experiment to function at an instantaneous luminosity of $5x10^{32}$ and a bunch spacing of 132ns. Without these improvements D0 will not be able to take useful data under Run 2b running conditions. The proposed upgrades include:

1. Fiber tracking trigger: At present the trigger track finder uses pairs of fibers as the finest grain element used to form tracks candidates. Under Run 2b conditions this relatively coarse granularity would result in unacceptable fake rates. The proposed tracking trigger upgrade will deal with this by tracking with individual fibers, which will (according to D0 simulations) help keep the fake rates under control. It should be noted that there are uncomfortably large uncertainties in these simulations.

2. Calorimeter trigger: D0 proposes to rebuild the entire calorimeter trigger system. This will result in three key improvements, each important for high luminosity running with 132ns bunch spacing.

   i) A digital filter algorithm will allow the correct beam crossing to be extracted from the very slow calorimeter output signals.
   ii) A sliding window algorithm will significantly sharpen the efficiency versus energy profile, allowing thresholds to be raised without compromising efficiency.
   iii) Smaller η-ϕ granularity will improve fake tracking trigger rates significantly (a factor of 30 for $H\rightarrow\tau\tau$, for example) by allowing precise matching requirements to be imposed between the calorimeter and the fiber tracker.

3. SIFT replacement: The current implementation of the VLPC readout system will not work at 132ns bunch spacing without seriously compromising performance. The chip's long integration time, combined with the 40ns needed for clearing, would result in a 43% charge collection efficiency. This is clearly unacceptable in a system where every photon counts.

4. Level 2 Upgrade: The original design of the Level 2 trigger assumed the use of Level 2α boards, based on the Alpha processor from COMPAQ. These boards had serious yield problems, leading D0 to embark on a Level 2β project to replace them. The Run 2a Level 2 silicon tracking trigger (STT) uses 4 silicon layers, combined with information from the fiber tracker, to implement a fast tracking algorithm. The Run 2b upgrade will extend this system to use information from a 5^{th}, and perhaps a 6^{th} silicon layer.

5. Commercial DAQ: The custom DAQ system developed for Run 2a has not yet met specifications. In light of this, D0 has begun investigating a new design based on commercial components. The collaboration noted that they are currently conducting their own internal review and suggested that the TRC allow that process to run its course before commenting. The committee has honored this request, with the understanding that it will be kept apprised of developments in this area.

Comments:

A number of the proposed trigger/DAQ improvements would be very beneficial for satisfactory operation in Run 2a. This is true of the L2β processor board, and the DAQ system. Upgrades, such as the Level 1 calorimeter trigger and the new SIFT boards, are needed are to handle the higher rates and shorter bunch crossing time associated with Run 2b.

The technical work done to date appears sound, but many details remain to be settled. The committee looks forward to seeing a completed TDR for the trigger upgrade at its next meeting.

Although work has started on simulating the D0 trigger, much remains to be done. In particular, the proponents have yet to complete a systematic study of the efficiencies and rates at each trigger level. Without such a study, it is difficult to know whether the proposed design is adequate or whether it will be possible to reduce the scope of the proposed trigger upgrades. It is clearly important to advance the trigger simulation studies (taking into account observations from Run 2a) as quickly as possible.

Despite these uncertainties, the need for most of the proposed upgrades is evident, since they are required either for compatibility with the 132ns crossing time (the Level 1 calorimeter upgrade and the SIFT replacement) or to make the system compatible with higher rate operation (the Level 2β and the Commercial DAQ).

Upgrading the Level 2 STT to use five silicon tracking layers is a prudent step that can be achieved with a relatively modest investment, however it is unclear at present whether extending the STT system to use all six silicon layers is justified for the baseline design.

The proponents should refine the funding profile for the trigger/DAQ projects in order to better fit the profile of available resources. It appears that many of the procurement costs can be back-end loaded, although development funds will be needed for all items at a fairly early stage.

V. CONCLUSIONS

1. Based on the CDF study of the sensitivity of the Higgs discovery capability on b-tagging efficiency we conclude that the silicon upgrades will play a crucial role in Run 2b.

2. It appears that the upgrade projects can be accomplished with resources close to those suggested by the laboratory, combined with those from outside sources.

3. There are strong dedicated teams working on the upgrade projects of both experiments.

4. For both silicon upgrades a quantitative optimization of the cost versus performance is still lacking. We recommend that the groups perform optimization studies before baselining, with the aim of justifying the chosen segmentation, number of layers, layer radius, etc. This would strengthen the case for the upgrades and justify the use of the resources requested.

5. It is important that both experiments have clear laboratory guidance on M&S costs, laboratory manpower, general contingency levels, and the treatment of indirect costs and installation costs.

While preliminary guidance has been given, there was a large gap between this and the proposed budget for the D0 upgrade. The committee believes the large D0 request is unjustified.

6. Both experiments need thorough WBS descriptions of their projects and resource-loaded schedules. We recommend that the laboratory review these to ensure that the necessary level of detail is given and that similar methodologies are used in the two cases. All elements required for the upgrades should be reflected, including those from foreign sources. A table of funding sources is also needed.

7. Both collaborations should work to identify the teams of physicists to be involved in these upgrade projects as well as the items on the critical path. Long-term planning is needed to ensure the successful completion of the upgrades. We encourage the spokespersons to play an active role in this process and to take advantage of the many collaborating institutions.

APPENDIX 1: CHARGE TO THE COMMITTEE

8/24/01

Technical Review Committee for the CDF/D0 Upgrade Projects

Charge

The CDF and D0 collaborations are preparing to start upgrade projects that will make it possible for the experiments to continue operating at higher and higher luminosities through 2007. The systems needing the most attention for higher-luminosity running are the silicon detectors and the data-acquisition/trigger system. The collaborations have been asked to submit Technical Design Reports for these and other required/desired upgrades to the Laboratory by October 8. After review this fall, it is planned to baseline the projects in early 2002. The current schedule calls for installation of the new silicon and possibly other detector components in the summer of 2004. For the success of the Tevatron Run II program, it is imperative that both the D0 and CDF upgrades be accomplished on this time scale.

The Technical Review Committee is being set up as a standing committee to review the design reports and progress throughout the construction period. Meetings are expected to be held twice per year. For the first meeting, the Committee is asked to read and critically review the TDRs received from CDF and D0. :

- Are the proposed upgrades scientifically justifiable?
- Are the proposed upgrades technically sound?
- Can the proposed upgrades be completed within the timeframe? Are there descoping options that can be exercised if needed?
- Are the cost estimates reasonable? Is there adequate contigency?
- Is the project planning adequate in terms of a management plan, WBS breakdown, and schedule with trackable milestones.
- Are the organizations and manpower allocations adequate to accomplish the projects?

The Committee should submit to the Director as soon as possible of the review a written report with comments and recommendations. At subsequent meetings, the Committee will be asked to review the progress of the upgrade projects and provide continuing comments and recommendations to the Director.

The Physics Advisory Committee (PAC) will also monitor the progress of the upgrades. However, the PAC also has to deal with other major topics, e.g. NuMI/MINOS, MiniBooNE, BTeV, CKM, and others. Therefore, the Laboratory would like this committee to concentrate on the technical aspects of the CDF/D0 detector upgrades, to aid the PAC in their deliberations. We anticipate that the Chairman will be asked to give summary presentations to the PAC.

APPENDIX 2: MEMBERSHIP OF THE COMMITTEE

Lothar Bauerdick	Fermi National Accelerator Laboratory
Francesco Forti	INFN, Pisa
Daniel Marlow	Princeton University
James Pilcher*	University of Chicago
Hartmut F.-W. Sadrozinski	University of California, Santa Cruz
Mats Selen	University of Illinois, Urbana-Champaign
Hiro Tajima	Stanford Linear Accelerator Center

* Chairperson

APPENDIX 3: AGENDA FOR THE MEETING OF DECEMBER 2001

CDF/D0 Run IIb Upgrade
Technical Review Committee Meeting
December 3-5, 2001

<u>Monday, December 3</u>

8:30 - 9:00	Executive Session	Comitium
9:00 - 12:00	Presentation by D0	Curia II

- Run IIb Project Overview (J. Kotcher)
- Silicon Mechanical (W. Cooper)
- Silicon Electronics and Readout (A. Nomerotski)
- Silicon Project: Cost and Schedule (A. Bean)

Break

- Level 1 Trigger (H. Evans)
- Level 2 Trigger (J. Linnemann)
- SIFT Replacement (M. Johnson)
- Commercial DAQ (G. Brooijmans)

12:00 - 1:00	Lunch	
1:00 - 6:30	Closed Session, Tour of SiDet, and Breakout Sessions	
7:00	Dinner	

<u>Tuesday, December 4</u>

8:30 - 9:00	Executive Session	Comitium
9:00 -12:00	Presentation by CDF	Curia II

- Run IIb Project Overview (P. Lukens)
- Silicon I - Performance Issues (B. Flaugher)
- Silicon II - Baseline Plans, Cost and Schedule (N. Bacchetta)

Break

- Preradiator Replacement (S. Kuhlmann)

- DAQ/Level 3 (F. Wurthwein)

12:00 - 1:00	Lunch	
1:00 - 6:30	Breakout Sessions	Comitium

Wednesday, December 5

8:30 - 12:00	Closed Session and Discussion with Proponents	Comitium
12:00 - 1:00	Lunch	
1:00 - 3:00	Closed Session (Preparation for Closeout)	Comitium
3:00 - 4:00	Closeout	Comitium